

Solving Equations, Part 2 Key

1a. $-6(x-3) - 26 = -8$
 $-6x + 18 - 26 = -8$
 $-6x - 8 = -8$
 $\quad + 8 \quad + 8$

$$\frac{-6x}{-6} = \frac{0}{-6} \Rightarrow \boxed{x = 0} \text{ conditional}$$

b. $3(2 - 5x) + 4(6x) = 12$

$$6 - 15x + 24x = 12$$

$$6 + 9x = 12$$

$$\frac{-6}{-6} \quad \frac{-6}{-6}$$

$$\frac{9x}{9} = \frac{6}{9} \Rightarrow x = \frac{6}{9} = \boxed{\frac{2}{3}} \text{ conditional}$$

c. $\frac{2}{3}x + \frac{4}{3} = -\frac{2}{3} \Rightarrow \frac{3}{1} \left(\frac{2}{3}x + \frac{4}{3} \right) = \frac{3}{1} \left(-\frac{2}{3} \right)$

$$\Rightarrow \frac{3}{1} \cdot \frac{2}{3}x + \frac{3}{1} \cdot \frac{4}{3} = \frac{3}{1} \left(-\frac{2}{3} \right)$$

$$2x + 4 = -2$$

$$\quad - 4 \quad - 4$$

$$\frac{2x}{2} = \frac{-6}{2} \Rightarrow \boxed{x = -3} \text{ conditional}$$

d. $\frac{2(x+1)}{4} = 3x - 2 \Rightarrow \frac{4}{1} \cdot \frac{2(x+1)}{4} = 4(3x - 2)$

$$2x + 2 = 12x - 8$$

$$\frac{-12x}{-12x} \quad \frac{-12x}{-12x}$$

$$-10x + 2 = -8$$

$$\quad - 2 \quad - 2$$

$$-10x = -10$$

$$\frac{-10x}{-10} = \frac{-10}{-10}$$

$$\boxed{x = 1} \text{ conditional}$$

e. $x + \frac{7}{6} = 2x - \frac{7}{6} \Rightarrow \frac{6}{1} \left(x + \frac{7}{6} \right) = \frac{6}{1} \left(2x - \frac{7}{6} \right)$

$$6x + \frac{6}{1} \cdot \frac{7}{6} = 12x - \frac{6}{1} \cdot \frac{7}{6} \Rightarrow 6x + 7 = 12x - 7$$

$$\frac{-12x}{-12x} \quad \frac{-12x}{-12x}$$

$$\boxed{x = \frac{7}{3}} \text{ conditional}$$

$$\frac{-6x + 7}{-7} = \frac{-7}{-7} \Rightarrow \frac{-6x}{-6} = \frac{-14}{-6}$$

cont'd

$$f. 14x + 7 = 7(2x + 1) \Rightarrow 14x + 7 = 14x + 7$$

This expression is always true (an identity)

$$g. 3x - 7 = 3(x + 1) \Rightarrow$$

$$\begin{array}{r} 3x - 7 = 3x + 3 \\ -3x \quad -3x \\ \hline \end{array}$$

$$-7 = 3 \quad \text{Contradiction}$$

X has no solution

$$h. -2(6x - 5) + 4 = -12x + 14$$

$$-12x + 10 + 4 = -12x + 14$$

$$-12x + 14 = -12x + 14$$

identity

X is all real numbers

$$i. 2(x + 3) - 5 = 5x - 3(1 + x) \Rightarrow 2x + 6 - 5 = 5x - 3 - 3x$$

$$\Rightarrow \begin{array}{r} 2x + 1 = 2x - 3 \\ -2x \quad -2x \\ \hline \end{array}$$

$$1 = -3$$

Contradiction

X has no solution

$$. 5y + 2(y - 6) = 4(y + 1) - 2 \Rightarrow 5y + 2y - 12 = 4y + 4 - 2$$

$$\Rightarrow \begin{array}{r} 7y - 12 = 4y + 2 \\ -4y \quad -4y \\ \hline \end{array}$$

$$\begin{array}{r} 3y - 12 = 2 \\ +12 \quad +12 \\ \hline \end{array}$$

$$3y = 14$$

$$\frac{3y}{3} = \frac{14}{3} \Rightarrow$$

$$\boxed{y = \frac{14}{3}}$$

Conditional

$$. \frac{5(x-1)}{4} = \frac{3(x+1)}{2} \Rightarrow$$

$$\frac{\cancel{4}}{1} \cdot \frac{5(x-1)}{\cancel{4}} = \frac{\cancel{4}^2}{1} \cdot \frac{3(x+1)}{\cancel{2}} \Rightarrow$$

$$5(x-1) = 6(x+1) \Rightarrow$$

$$\begin{array}{r} 5x - 5 = 6x + 6 \\ -6x \quad -6x \\ \hline \end{array}$$

$$-x - 5 = 6$$

$$\frac{-x}{-1} = \frac{11}{-1}$$

$$\boxed{x = -11}$$

Cont'd

l. $x + \frac{5}{4} = \frac{3}{4}x$

$\Rightarrow 4(x + \frac{5}{4}) = \frac{3}{1}(\frac{3}{4}x)$

$4x + \frac{5}{1} = 3x \Rightarrow 4x + 5 = 3x$
 $\begin{array}{r} 4x + 5 = 3x \\ -3x \quad -3x \\ \hline x + 5 = 0 \\ -5 \quad -5 \\ \hline x = -5 \end{array}$

conditional

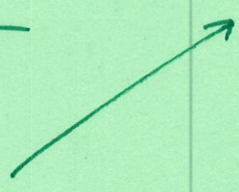
m. $\frac{x}{5} - 7 = \frac{x}{3} - 5$

$\Rightarrow 15(\frac{x}{5} - 7) = 15(\frac{x}{3} - 5) \Rightarrow$

$\frac{15}{1} \cdot \frac{x}{5} - 15 \cdot 7 = \frac{15}{1} \cdot \frac{x}{3} - 15 \cdot 5$

$3x - 105 = 5x - 75$
 $\begin{array}{r} 3x - 105 = 5x - 75 \\ -5x \quad -5x \\ \hline -2x - 105 = -75 \\ +105 \quad +105 \\ \hline -2x = 30 \end{array}$

$\begin{array}{r} -2x - 105 = -75 \\ +105 \quad +105 \\ \hline -2x = 30 \end{array}$



$\begin{array}{r} -2x = 30 \\ -2 \quad -2 \\ \hline x = -15 \end{array}$

$x = -15$

conditional

n. $4(2+x) + 1 = 7x - 3(x-2) \Rightarrow 8 + 4x + 1 = 7x - 3x + 6$

$4x + 9 = 4x + 6$
 $\begin{array}{r} 4x + 9 = 4x + 6 \\ -4x \quad -4x \\ \hline 9 = 6 \end{array}$

contradiction

x has no solution

o. $\frac{9}{2} + \frac{5}{2}y = 2y - 4 \Rightarrow$

$2(\frac{9}{2} + \frac{5}{2}y) = 2(2y - 4)$

$9 + 5y = 4y - 4$
 $\begin{array}{r} 9 + 5y = 4y - 4 \\ -4y \quad -4y \\ \hline 9 + y = -4 \end{array}$

$\begin{array}{r} 9 + y = -4 \\ -9 \quad -9 \\ \hline y = -13 \end{array}$

$y = -13$ conditional

p. $0.02(6t - 3) = 0.12(t - 2) + 0.18$

$0.12t - 0.06 = 0.12t - 0.24 + 0.18$

$0.12t - 0.06 = 0.12t - 0.06$ identity

t is all real numbers

cont'd

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$$g. x(x-3) = x^2 + 5x + 7 \Rightarrow \begin{array}{r} x^2 - 3x = x^2 + 5x + 7 \\ -x^2 \quad -x^2 \\ \hline \end{array}$$

$$\begin{array}{r} -3x = 5x + 7 \\ -5x \quad -5x \\ \hline \end{array}$$

$$\frac{-8x}{-8} = \frac{7}{-8} \Rightarrow \boxed{x = -\frac{7}{8}}$$

conditional

$$r. 2z(z+6) = 2z^2 + 12z - 8$$

$$\begin{array}{r} 2z^2 + 12z = 2z^2 + 12z - 8 \\ -2z^2 \quad -2z^2 \\ \hline \end{array}$$

$$12z = 12z - 8 \quad \text{Contradiction}$$

x has no solution